ABSTRACT FOR 2006 LANDFILL METHANE OUTREACH CONFERENCE

The Landfill Gas Energy Recovery Hoax

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Because EPA has made fundamentally flawed assumptions concerning the proportion of landfill emissions not captured by gas collection systems, the entire LMOP effort is misplaced. In its place, in order to reduce net greenhouse gas emissions from landfills, EPA should instead pursue the European model of phasing out the landfilling of organic material.

EPA's fabric of analysis for landfill's contribution to greenhouse gases is predicated upon the most basic error in definitions concerning the gas capture rate and in modeling and input assumptions that are inaccurate.

Before addressing the fact that EPA's assigned capture rate is an arbitrary assumption, the agency uses a definition for that value that is inapposite. EPA states that its assumed 75% capture rate is an instantaneous rate for the year in which the calculation is made. The first flaw in this definition is the fact that IPCC specifically states that the analysis should be done over extended periods. The second, and fatal flaw here as applied is the fact that EPA completes its calculations for landfill's contribution to climate changing gases on a carbon equivalent basis using a 100 year basis for the conversion of methane's to carbon's impact. If a shorter period were used, the conversion factor would have to be greater than the 21 times that EPA uses in estimating landfills' GHG responsibility because methane breaks down in the environment over a shorter interval than CO_2.

Just correcting for this definitional error, and, again, leaving for the moment the EPA's unsupported assumption that instantaneous gas collection efficiency is 75%, results in a corrected 100-year lifetime capture rate of only 28.5%.

However, the first order decay model, as applied, does not accurately describe conditions in modern landfills; the capture rate is based upon unsupported and biased assumptions that grossly overstates the situation, and other adjustments used to reduce landfills' responsibility for greenhouse gases are similarly unsupported and contradicted by the facts. To simplify these considerations, a more reasonable instantaneous rate would be in the order of 50%. Converting a more accurate instantaneous 50% rate to a life time rate is 19%.

These adjustments have the most profound effect on the vitality of energy conversion because the benefits are closely a function of how efficient gas collection really is. For, now matter how many offsets energy conversion can claim, the losses from the fraction of landfill gases that are not captured must be subtracted from those apparent gains, as illustrated in the following sensitivity analysis.

SENSITIVITY ANALYSIS OF NET GHG EMISSIONS FROM ENERGY RECOVERY OF LANDFILL GAS TO GAS COLLECTION EFFICIENCY (MTCE/Wet Ton MSW)								
(a) Gas Coll. Efficiency	(b) Emissions	(c) Captured	(d) Oxidized	(e) Net Emissions MTCE/ Wet Ton MSW	(f) % Net Emissions from Greater Efficiency	(g) Energy Offset	(h) Net Emissions After Offset	(j) % Net Offset Relative to Before Offset
0%	0.273	0.0000	0.0273	**0.2457**	**n/a**	0.0000	0.2457	0%
10%	0.273	0.0273	0.0246	0.2211	-10%	0.0050	0.2161	-2%
20%	0.273	0.0546	0.0218	***0.1966***	-11%	0.0100	***0.1866***	-5%
30%	0.273	0.0819	0.0191	0.1720	0%	0.0150	0.1570	-9%
40%	0.273	0.1092	0.0164	0.1474	-14%	0.0200	0.1274	-14%
50%	0.273	0.1365	0.0137	0.1229	-17%	0.0250	0.0979	-20%
60%	0.273	0.1638	0.0109	0.0983	-20%	0.0300	0.0683	-31%
70%	0.273	0.1911	0.0082	0.0737	-25%	0.0350	0.0387	-47%
75%	*0.273*	*0.2048*	*0.0068*	***0.0614***	-17%	*0.0375*	***0.0239***	**-61%**
80%	0.273	0.2184	0.0055	0.0491	-20%	0.0400	0.0091	-81%
90%	0.273	0.2457	0.0027	0.0246	-50%	0.0450	-0.0204	-183%
100%	0.273	0.2730	0.0000	0.0000	-100%	0.0500	-0.0500	n/a

The reductions in greenhouse gases achieved when the owner of a landfill with a gas collection system adds energy recovery under EPA's 75% capture rate assumption is shown by comparing Cols. (e) and (g) for the Row labeled 75%, in which the reduction is 0.0375 MTCE per wet ton of MSW, or 61.1%.

However, if the better assumption is an overall capture rate of approximately 20%, the reduction shown on that row is only 0.01 MTCE/wet ton of MSW, or 5.1%.

That is to say, the environmental gains from adding energy recovery of landfill gas is only apparently significant when unrealistically high capture rates are assumed.

This fact, based upon a proper accounting for the majority of the time when there is no functioning gas collection, and for gas collection's inefficiencies when it is operation, provides a compelling argument for the United States to instead adopt the European strategy of banning organic wastes from the land disposal if we are to meaningfully address landfills' responsibility for greenhouse gases. ❑